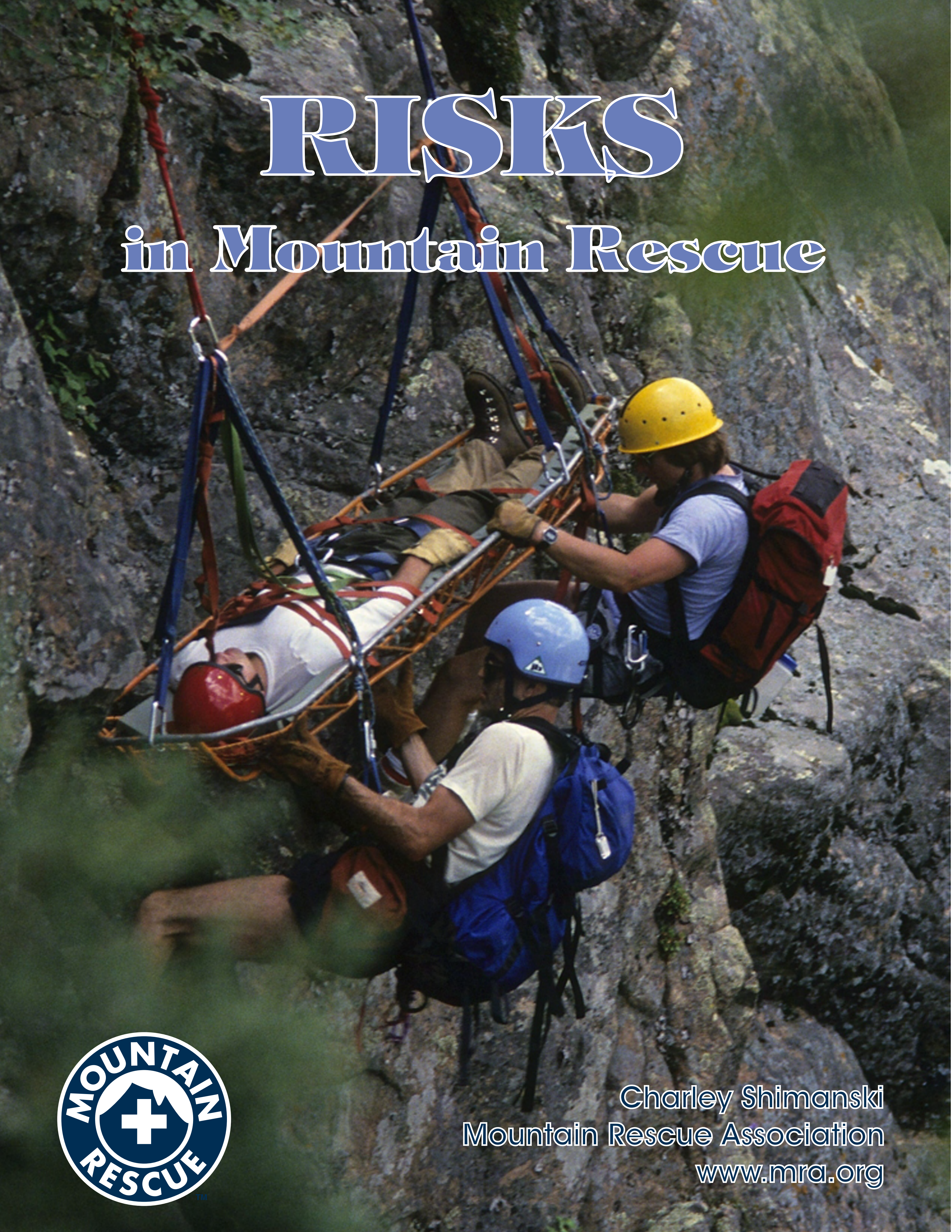

RISKS

in Mountain Rescue

Charley Shimanski
Mountain Rescue Association
www.mra.org

MOUNTAIN RESCUE ™

Risks

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COVER PHOTO: Photo courtesy Howard Paul.

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Objective

The Mountain Rescue Association, a national non-profit membership association dedicated to saving lives through rescue and mountain safety education, has developed this program to be used by any organization that may be required to respond to a backcountry rescue operation.

At the conclusion of this course, students should be able to:

1. Identify how mother nature, physical elements, mental and emotional elements, and external influences contribute to risk in rescue operations;
2. Understand other external hazards affecting risks in rescues, and;
3. Understand methods to reduce risk on the basis of the elements presented.

This program would not have been possible without the kind assistance of many mountaineers and rescuers. Our thanks to all whom offered assistance.

About the Author

Charley Shimanski is President and Education Director for the Mountain Rescue Association, a national organization of rescue mountaineers. A 20-year veteran of Colorado's *Alpine Rescue Team*, Charley has participated as a field member and Incident Commander for hundreds of rescues among Colorado's highest peaks.

The author of the Mountain Rescue Association's *Helicopters in Mountain Rescue Operations* manuals and co-author of the *Avalanche Rescue Operations* manual, Charley has consulted rescue mountaineers, mountain guides, and climbers throughout the world, from Israel to China, from Kilimanjaro to Aconcogua. Charley is a frequent speaker at meetings of the International Technical Rescue Symposium, The National Association of Search and Rescue, the Wilderness Medical Society, and the Mountain Rescue Association.

Dedication

This program is dedicated to Terry Leadens.

Introduction

In the past decade, there has been a dramatic increase in popularity of mountain recreation. Advances in equipment and skills have made it possible for mountaineers to delve further and higher into the backcountry. And with the increased interest in adventure, there lies an increase in the need for qualified rescue mountaineers. Each year, backcountry users will make decisions that result in accidents. Whether by bad decision making or by simple bad luck, backcountry users will often need the assistance of qualified rescue mountaineers. And while it is critical that rescue groups work to fine-tune their skills at rescue operations, it is equally essential that rescuers have a clear understanding of risk assessment and hazard evaluation.

When it comes to rescue operations, time is of the essence. For this reason, risk assessment skills must be well developed before the rescue begins. Rescuers must be aware that they are not invincible, and that one can never eliminate all risks.

Rescuers must also be aware of their potential to lose their "attention to detail" once they've been involved in search and rescue operations for many years.

> ***"Familiarization, and prolonged exposure without incident, leads to a loss of appreciation of risk"***
>
> *Dr. Ken Kamler – Mt. Everest expedition physician, 1996*

We hope this training material will assist you in learning risk assessment skills prior to the actual rescue operation.

We have broken risk factors in rescue operations into five major factors. They are:

- Mother Nature
- Physical Elements
- Mental Elements
- Emotional Elements
- External Influences

Each of these factors will be discussed in detail. In addition, profiles of accidents during actual mountain rescue operations will be included.

Part 1 – Mother Nature

Whether you are out on a simple backcountry adventure or participating in a complex rescue operation, Mother Nature offers risk factors to all situations. Lightning, avalanche, rockfall, severe storms, and whitewater issues are all elements that must be considered by rescue mountaineers. Whether experienced or novice at rescue work, the rescuer must have assessment skills beyond that of the ordinary backcountry enthusiast.

Weather Prediction/Forecast Skills for the Rescue Leader

An essential skill for any rescue leader is the ability to understand weather forecasts and their effect on rescue operations. Certainly not all rescue leaders can be schooled in meteorology and weather forecasting, but they do need to know the basics. Essential information is also available to most rescue units in the continental United States from qualified weather service offices – although rescuers should know what to ask from the vast atmospheric tools available.

Qualified rescue leaders must quickly assess the current weather conditions and obtain a weather forecast from forecasters with sophisticated computer forecast models. Any rescue team must include in their Resource Directory any phone numbers for weather service forecasters and avalanche forecast centers. The accessibility of cellular telephones makes it possible for rescue leaders to obtain such forecasts directly from their base of operations. Some rescue leaders may even seek such forecasts from their cellular telephone while en route to the rescue.

In the absence of cell phones, a rescue leader should develop a means of obtaining a forecast through his/her local law enforcement authority, generally the dispatcher of the local sheriff or state police. This must be worked out in advance, as part of the rescue team's pre-plan.

Rescue leaders should speak directly to the weather service forecaster, who can give up-to-the-minute forecasts for specific altitudes and locations. One must not rely on pre-recorded forecasts, hot lines, or newspaper/radio/television forecasts.

Weather forecasts are necessary not only for the well being of rescuers in the field, but also for the safety of any air operations that may take place. Helicopter and fixed-wing pilots will be acutely interested in weather forecasts when they are dispatched to the scene. Equally important, the prudent rescue leader will take into consideration the current and forecasted weather when considering whether or not to utilize airborne resources.

Weather and the Rescuer in the Field

Hypothermia is the most common cause of accidental death in the mountains. It results when the body loses more heat than it can generate. Hypothermia often results when an individual is unprepared for the cold that confronts him/her. In fact, the state with the most reported cases of hypothermia is, believe it or not, Florida! The reason is simple. Floridians are generally unprepared for cold weather. Hypothermia is especially dangerous for rescue mountaineers, since it impairs your most important asset and survival tool - your brain.

Effective dressing is the simplest way to avoid hypothermia in the dynamic weather of the mountains. Rescue mountaineers must be aware that the most effective way to dress is by "layering". This method has been proven, not only on Mount Everest but in the cold northern regions of Alaska as well. Layering simply means wearing one thing over another over another over another – you get the idea.

The advantage of the layering system is that one can add and remove protection from the elements in small increments, thus balancing heat generation with heat loss. In addition, layering traps dead air for additional weight-free insulation.

The body is a source of heat, which you want to retain within your clothing. It is also a source of moisture, in the form of perspiration that, in many situations, must be kept away from the skin due to the cooling effect of evaporation. For this reason, the layers of clothing near your body should be thin and porous to hold in heat and wick away the perspiration. Middle layers should be thicker in insulating quality to hold in more heat, yet be able to dissipate the moisture further away from the body. Wool and synthetic pile are effective for this purpose, since most of their insulating quality is retained when wet. Finally, the outer layers should be thick enough to prevent heat loss and still protect the inner layers from the external elements. The most effective outer layer is completely waterproof, yet allows water vapor (perspiration) to escape. Most conventional rain-gear does not allow water vapor to breathe, thus the body's perspiration is held within the layers of clothing.

Through practice, you can learn to add and remove layers of clothing at just the right times. The rule of "befores" applies here. You should remove a layer of clothes before you begin to sweat, add a layer before you get cold. Eat before you get hungry, drink before you get thirsty. By doing so, you can balance the amount of your body's heat generation with heat loss. Conserve your sweat, not your water!

Weather Recognition

While focusing on the actual rescue operation, rescuers and rescue leaders must keep an “eye on the sky.” Sudden storms can often be predicted in mountainous terrain without the help of forecasters. Rescuers must pay attention to developments above the ground. As clouds get bigger, darker, and lower, the storm is building.

The build up of clouds in the sky can often be used to predict storms in the mountains. One must pay attention not only to the number of clouds in the sky, but also to their rate of growth and speed of movement. Focus on one particular cloud, and watch its rate of growth over several minutes.

Rescuers should also be familiar with the use of barometers/altimeters, and how they can be used to predict local weather. The use of an altimeter and/or barometer can help the well-equipped rescue mountaineer and aid in weather forecasting.

Rockfall

Rockfall is certainly one of the more hazardous conditions that face rescuers in the mountains. While we must be alert and aware that we can trigger rockfall during technical rescue efforts, experienced rescue mountaineers will know that natural rockfall is most common during the spring or after rainstorms.

Natural rockfall can often lead to disaster in the mountains. One small rock breaking loose can lead to a large rock avalanche, which can cause dangerous consequences.

Natural rockfall is common following freeze-thaw cycles in the spring. Rockfall will often occur in the warm afternoon following a normal cold spring evening. This is often aggravated by wet conditions in the day or days preceding the event.

Many fatal rockfall accidents occur when members of a party trigger the event. For this reason, rescuers should always wear UIAA approved helmets, and should equip any rescue subject with a helmet as well. Litter shields, designed to protect the subject’s face from rockfall, are also an essential element of any mountain rescue.

One significant risk of rockfall is that rescuers' ropes could be cut in the impact of rock against rock. The other risk is that of rock striking rescuers and/or victims.

> *On March 7, 2001, a group of rangers from Arches National Park were performing technical rock rescue training. A rock estimated between 30- and 40-feet fell nearly 300 feet from the top of a cliff. It broke into smaller pieces on its way down, causing a loud noise. Two park employees were injured. Andrew Fitzgerald was knocked to the ground by flying debris and suffered a head injury and multiple lacerations; Lee Kaiser, who was not among the six, injured his leg slightly while trying to get away from the flying rock. Fitzgerald was treated for his injuries, secured to a litter, lowered over the side of a 100-foot cliff to a second team, then transported a quarter-mile cross-country to a waiting ambulance.*

Rain had fallen off and on for several days prior to the training session. The rain-weakened condition of the sandstone, an existing crack in the rock, and freeze-thaw conditions typical of late winter in the area are thought to have been the primary reasons for the natural release.

Icefall

Climbing, and rescuing, is far more hazardous on ice than on rock. This is largely because ice is generally less stable than rock. Icefall is a hazardous situation for rescue professionals as well as climbers. Rescuers who work in areas popular among ice climbers must be aware of the objective and subjective hazards associated with rescues in these circumstances. Climbers and rescuers on ice are using tools that are generally very sharp. Between the ice axes, crampon points, and ice tools, there are many items that can cause serious injury in the event of a fall.

Ice on the sunny side of a mountain is more prone to decay at certain times of the year. Spring conditions are also much more hazardous, and routes with horizontal cracks are showing the early signs of collapse. Warm temperatures cause ice structures to be more hazardous and also more prone to decay. Runoff on ice routes is a good indication that the hazard of icefall is increasing. Helmets are of course mandatory, and a good line of defense against small pieces of falling ice.

On March 24, 1998, two rescue mountaineers from Las Vegas Metro Police Department (LVMDP) Search and Rescue had just descended from a frozen waterfall where they had been engaged in an ice climbing training. They were on Echo Face near the Cathedral Rock area. Suddenly, in a freak accident, thousands of pounds of ice fell on them. The ice narrowly missed a rescue team volunteer, and killed Russell Peterson, an eight-year veteran of the police department and the Search and Rescue Team.

Peterson, a very experienced beloved member of LVMPD, had been on countless SAR missions for their SAR team over the years. He was killed immediately. His partner hiked two hours to notify authorities.

Lightning

Although we hear more on the news about such weather disasters as hurricanes, avalanches, tornadoes and flash floods, no element of Mother Nature takes more lives each year than lightning. Between 1940 and 1981, an average of 185 Americans were killed each year by lightning. Of all the weather hazards in the mountains, lightning kills the most (source: National Oceanic and Atmospheric Administration).

Lightning is a very dangerous yet somewhat avoidable hazard of mountaineering. With a small degree of understanding of the electrical energy of a lightning strike, the mountaineer can better reduce the risk of death or injury.

Lightning almost always occurs in conjunction with a thunderstorm. In fact, the frequency of the lightning can usually be determined by the intensity of the thunderstorm. In a well-developed thunderstorm, strong updrafts and downdrafts create an intense electrical field. The upper section of the storm builds up a strong positive charge, while the lower section develops a negative charge. Whereas the ground is normally negatively charged, the strong negative charge of the storm induces a positive charge on the ground as the storm passes overhead. An electrical charge begins to accumulate in buildings, trees and other tall objects. When the difference between the charges is great enough, the insulating atmosphere between the cloud and ground is insufficient, and an electrical connection is made. The result...a lightning strike.

The basic dangers of lightning are not only that of being the subject of a direct strike, but of being in the path of ground currents as the electrons flow to the location of a nearby strike.

This text is not intended to teach lightning safety. For further details on texts in this area, see the Reference Guide in the back of this manual.

Avalanche

Rescue leaders in mountainous terrain must have an acute understanding of avalanche hazard. Again, one should use local avalanche forecasters, and have telephone numbers for such forecasters within the Resource Directory. Rescuers need basic avalanche training to be able to competently recognize and negotiate avalanche hazard. Avoiding avalanches is certainly easier than surviving them.

> *On January 25, 1982, 17 year-old Hugh Herr and 20 year-old Jeff Batzer climbed Huntington Ravine on the northeast side of Mt. Washington – well known for its extreme weather. Descending in a whiteout, they mistakenly went by way of the vast wilderness of the northeast ridge, not the southeast ridge as they had thought.*
>
> *Albert Dow, an instructor at the EMS Climbing School in North Conway, and Michael Hartrich were part of New England's Mountain Rescue Service sent to look for Herr and Batzer. Dow and Hartrich found the lost climbers' trail. While the two were searching, a 3-foot slab avalanche ran down a 30-degree slope and overtook the pair. 70-feet wide and 100-feet long, the avalanche buried Dow completely. Hartrich, mostly buried, was able to reach his radio and call for help. Within 25 minutes, two rescuers arrived to dig out Hartrich. 90 minutes after the accident they found Dow. There was no sign of there having been any respiration while buried and CPR produced no results. It was apparent from his obvious injuries that he had hit a number of trees.*

This text is not intended to teach avalanche awareness or avalanche forecasting. For further details on texts in this area, see the Reference Guide in the back of this manual.

Weather and Aviation Support

Rescue leaders must have an acute understanding of how weather affects the use of aviation support in the mountains.

Weather, combined with altitude and terrain, will all affect the usefulness of helicopters in search and rescue operations. All aircraft are limited in their working altitude (called service ceiling), which can change based on the temperature and humidity

Turbulence may be a serious problem to a pilot; therefore mornings are usually the best time for flights because there is less turbulence than with afternoon heating by the sun. Cumulus clouds indicate turbulence and strong updrafts and downdrafts. Also, there are often downdrafts over the middle of a valley, and such currents may be dangerous at high elevations because of reduced engine power. Conversely, updrafts often exist over ridges or on the sunny side of ridges. Leeward side of ridges may have severe downdrafts.

Visibility is a serious problem for helicopter pilots. Fog and rainy conditions can lead to reduced visibility, often in just a matter of a few minutes.

September 12, 1997 was the fifth day of a search for 73 year-old John Devine, who went on a hike in Olympic National Park. 150 people from a dozen rescue groups, including several from Canada, a CAP plane, and 5 helicopters, were used to assist in the rescue.

On that fifth day of the search, a Bell 205 A1 helicopter was rented from a private company in Eugene Oregon. The helicopter attempted to pick up rescuers from the peak at the end of their assignment.

Accident reports reveal, "The pilot advised the SAR personnel to load quick, as he had no intentions of spending the night there... the helicopter performed a vertical takeoff in the obscuration. According to the remaining SAR personnel, they lost sight of the helicopter about 50 feet agl. They continued to hear the helicopter throughout its climb, impact, and as it fell down the side of the mountain... The sound of the tumbling helicopter was described by several witnesses as that of an avalanche and caused several SAR personnel to take cover.

Witnesses reported that the weather conditions in the accident area were instrument meteorological conditions (IMC) with very low ceiling and visibility less than 1/4 mile in fog. The National Transportation Safety Board determines the probable cause(s) of this accident as follows: the pilot's intentional flight into known adverse weather conditions in mountainous terrain.

Eight people were on board when it crashed... Three rescuers died (although witnesses report that many more would have died were it not for the expert care by rescuers on scene who were waiting for their turn to be evacuated when the helicopter returned).

Killed in the accident were Kevin Johnston (35) pilot, Taryn Hoover (31) seasonal employee of Olympic National Park, and Rita McMahon (52) President of West Coast Search Dogs. Five rescuers on board suffered injuries, some serious.

Part 2 – Physical Elements

There are a great number of physical elements that contribute to risks in rescue operations. By physical elements, we refer to elements related to the physical well being of the rescuer and the understanding of the physical components of the rescue systems being used.

Equipment

A rescue mountaineer's personal mountaineering equipment must be in excellent condition. The rescuer must assure that all personal equipment is in good working order and is suitable for all possible weather conditions. Personal rescue equipment should be lightweight, functional and fully integrated.

Certainly all rescue members must have a strong awareness of the physical components of the rescue system to be used. Familiarity with equipment is essential, as is an understanding of the appropriateness of the equipment to be used. Actual rescue operations should not be the time for rescuers to learn equipment and techniques. A well-prepared rescue team will have regularly scheduled classroom and field trainings to assure that each rescuer has the necessary understanding of and experience with complex technical systems. The Reference Guide in the back of this manual should provide assistance in locating texts that teach technical rescue operations. Still, there is no substitute for actual experience and fieldwork.

An experienced mountain rescue team has gained the skill of breaking each rescue down into small components. By doing so, the goal of the rescuers is to master every individual component.

Rescue team leaders must also assure that equipment is periodically tested before it goes in the field. This may mean testing equipment at the trailhead (such as avalanche beacons) or testing equipment periodically at the rescue team headquarters (such as warm IV set-ups and O2 regulators). Checklists should be developed for testing equipment at the headquarters, and the team should have a qualified Equipment Manager to assure this is accomplished. The lives of rescuers and subjects depend on this.

Equipment Managers must also assure that logs are kept when any equipment such as ropes are used in any situation, rescue or training. It is essential that these logs are frequently reviewed and that ropes are retired when they have been used extensively. In addition, ropes and other technical equipment must be inspected after they have been used for any purpose. Routine inspections and equipment turnover need to be managed by a rescue team's Equipment Manager. For example, ropes and slings should be retired after five years, even if they are still "brand new."

> *On August 12, 1995, a climber broke his ankle in a fall just 900 feet from the top of Mt. Rainier. His two companions returned to Camp Muir, stating they left the injured climber with all their extra food, water, and clothing. Park officials were concerned that the injured climber had been left alone by his partners, especially given that the subject was erroneously reported as being "shocky."*
>
> *Two rescuers set out for the injured climber at 7:00 p.m. At 11:25 p.m., one of the rescuers radioed that they were at 12,900 feet, that it was cold and windy, and although they were having crampon problems, they would continue. They expected to reach the injured climber by 1:00 a.m.*

All attempts to contact the two rescuers after that last transmission were unsuccessful. A second rescue team reached the injured climber at 5:00 a.m.; although the initial two rescuers had never arrived.

Later the next day, a climbing party found an NPS ice axe and part of a crampon at the 13,000-foot level on the Winthrop Glacier. The bodies of rescuers Sean H. Ryan (23) a seasonal climbing ranger with 11 ascents of the peak, and Philip J. Otis (22), a Student Conservation Association aide were found 1,000 feet below that location. They had fallen to their death.

The rescuers reported having crampon problems, and given that part of a crampon was found at the spot where they presumably fell, it is clear that equipment failure was contributory cause of this tragedy.

Physical Conditioning

Since many mountain rescue operations occur deep in the backcountry, rescuers should be in peak physical condition. They must avoid the tendency to think they are invincible because they have a “Mountain Rescue” patch on their jacket. Rescue subjects are counting on the rescuer having the ability to sustain a long approach to the rescue, followed by the difficult, often physically exhausting rescue itself.

Rescuers must prepare for rescues as they actually begin. An experienced rescuer who has just been called to a difficult rescue will often spend the time en route eating some food and drinking water. While the rescuers are actually on the trail, they must stop periodically to drink water and, when necessary, eat more food. A rescuer racing to the scene on an empty stomach is a hazard to him/herself as well as the rest of the operation.

Rescuers must be careful not to exhaust themselves in the approach to the rescue scene. Rushing to the scene hauling heavy equipment while full of adrenaline can result in rescuers who have no reserves for the actual rescue effort. For this reason, a wise rescuer will look for opportunities to rest during the approach and throughout the rescue efforts.

Physical Skills

While it is important that rescuers understand the physical components of rescue systems, it is equally important that a rescuer also understand the physical skills necessary to engage in the rescue operation itself. In a vertical rescue operation on a big wall, rescuers on the litter must have experience with such operations. This will include the knowledge of how to maneuver a litter on vertical walls as well as how to maneuver oneself around (and potentially on top of) the litter itself.

While vertical rescue operations are exhausting to the litter attendants, low- to moderate-angle technical rescues can be more exhausting. In the vertical situation, the weight of the subject, rescuers and equipment are generally fully loaded on the anchors above. In the low- to moderate-angle evacuation, this weight is often transferred to the arms and legs of litter attendants. In this situation, rescuers must have the upper- and lower-body strength to sustain long evacuations. Rescuers with experience are often prepared for the physical requirements of such operations. Adrenaline-laden novices, on the other hand, may be unprepared. Again, periodic field training by the rescue team will help rescuers understand the physical skills necessary to complete the operation. It is then up to the rescuer him/herself to assess whether he/she is up to the task.

Rescuers must know their limits. It is essential that a rescuer take breaks when necessary. Rescuers should be careful not to:

- Stay on the litter too long
- Search too long
- Manage the incident too long

For this reason, judgment is an essential skill of the rescue mountaineer.

Rescue Techniques

Control of the subject by rescue teams during a technical rescue is essential. A technical rescue is not the time to teach the subject how to rappel, Jumar or climb. Rescue teams must not allow the subject to control their own ascent or descent, even if they are a climber or mountaineer. All subjects of a technical rescue should be placed on systems independent of the subject's control.

Whenever possible, rescue teams should approach a subject of a technical rescue from above rather than from below. This reduces the risk of additional rock and/or debris falling on the rescuers, either accidental or intentional, by the subject(s). Rescue teams approaching from above must be careful to choose a line that does not place the subject in danger of rockfall him/herself.

Finally, all rescuers must be skilled at the techniques their team uses for rescue operations. Frequent team practices are essential to team members becoming comfortable with their equipment and techniques.

Emergency Medical Providers

When there appears to be a conflict between the evacuation (technical) and medical (EMS) personnel, the highest level of EMS should take precedence in matters of patient care, but must defer to the technical rescue expert with issues of technical safety and evacuation abilities. After all, rapid transport to an advanced medical facility is often the highest priority. The subject is usually stable – dead or alive. Don't let the evacuation come to a halt to provide medical care unless that medical care is necessary and the patient is truly life-or-death.

When it comes to helicopter evacuations, it is generally preferable to use a Basic Life Support Rescue Team Member on an external load (short haul, long line, cable hoist, or helicopter skid ride) rather than an ambulance or other non-wilderness rescue team Advanced Life Support provider with no experience in external loads.

Experience in the Environment

Rescue mountaineers should be mountaineers first, rescuers second. Experience in mountaineering is essential so that the rescuer understands from his or her experience in the mountains. Since the earliest days, mountaineers have apprenticed under experienced mentors, and they gain experience from every mountaineering adventure. This experience leads to an increase in confidence, and increased abilities to deal with adversity on the mountains.

For example, does the rescuer understand the "rest step," a special technique used in mountain climbing designed to put the minimum amount of strain on the leg muscles while climbing? Is "pressure breathing" a technique that the rescuer now only knows, but has practiced until it becomes second nature. Efficiency of movement and judgment only come from extensive experience.

At the same time, highly experienced rescue mountaineers must be aware that experience can also lead to lack of attention to details. Dr. Ken Kamler, a doctor on Mt. Everest in 1996, notes that “Familiarization, and prolonged exposure without incident, leads to a loss of appreciation of risk.”

On May 23, 1977, two climbers began an attempt to climb the Yosemite Buttress in Yosemite National Park. Ultimately, one of the climbers fell and injured himself, and the other called for help. He was told that rescuers would be coming in the morning.

Six rescuers started walking up an established trail up Yosemite Falls trail at 3:30 a.m. the following morning in search of the ill-prepared rock climbers who had cried out in the dark. For an unknown reason, experienced Yosemite rescuer Jack Dorn walked off a well-worn path and plunged 400-600 feet to his death. He had been wearing a portable tape player at the time of the accident.

Food, Water, and the Rescue Mountaineer

The rescue mountaineer’s lunch, it is often said, begins just after breakfast. A well-fed mountaineer can survive extreme weather conditions and long hard climbs better than one with no extra calories to burn. This is also true for rescue mountaineers. Rescuers must remember that adrenaline often reduces one’s appetite. Like a mountaineer at extreme altitudes, a rescue mountaineer must make certain to eat on occasion, even in the absence of an appetite. Energy bars are valuable in this regard.

Rescuers must avoid dehydration. Frequent stops to drink water are critical to the rescue mountaineer’s ability to sustain a long rescue operation. You can monitor your hydration level by monitoring your urine - urine needs to be “clear and copious” to carry off the by-products of serious physical exertion.

Sleep (yes, sleep!)

While we pay great attention to our need for food and water, we must also pay close attention to our need for sleep. As much as adrenaline can kill one’s appetite, it can also effect one’s desire to sleep. With an increase in sleep deprivation comes an decrease in one’s ability to think and reason. Risk assessment is all about reason, and yet we too often neglect what may be one of the most dangerous aspects of SAR work.

The solution to this problem is not a simple one. Rescue teams cannot call for “nap time” in the midst of a SAR mission. Therefore, it is important for rescue teams to have an adequate number of qualified rescuers so that the rescue leader can rotate individuals and allow rescuers to have sufficient rest time.

Most rescue mountaineers are in good physical condition, and can easily sustain working in the field for 24-48 hours without sleep. The risk to rescue operations is not that rescuers might physically collapse. Rather, the grater risk is the gradual loss of mental alertness that results from sleep deprivation. Mental acuity is the key to the subjective evaluation of risk. Whenever a rescuer is exhausted, their mental guard is down.

This is also important for rescue command personnel when a rescue is completed. Should rescuers be allowed to get behind the wheel of their car late at night to drive home after a long and difficult rescue operation?

On May 2, 1994, Lisa Hannon was working as Incident Commander for the State of Virginia. She was leading a massive search for a missing five year-old boy lost in the mountains. She *worked all day and throughout the night.*

On a "bright, clear morning" on May 3, Lisa left to drive home. Less than an hour after she left, she fell asleep behind the wheel, struck a tree and was killed.

Lisa Hannon was posthumously awarded the NASAR State Award for Virginia that year.

Part 3 – Mental Elements

There are a number of elements related to the mental health of the rescuer that should be considered when evaluating risks in rescue operations.

Mission Analysis

The first actions by rescue team members and team leaders are the Mission Analysis during which an initial plan is developed. This often occurs long before the rescuers are at the scene of the emergency – often starting as soon as the initial dispatch occurs. Mission analysis is the ability to develop short term, long-term and contingency plans, as well as to coordinate, allocate and monitor resources.

Risk Assessment

The most essential skill for the rescue mountaineer is the ability to recognize and evaluate risks inherent in mountain rescue operations. Risk management is a holistic process. All your decisions will be based on the integration of both subjective thoughts and objective physical parameters. Good decision-making is brought about by gathering sufficient information and evaluating it with knowledgeable person(s). It takes many years of experience in any field to gain the skill of recognizing risk, let alone knowing what to do with that information. In mountain rescues, the rescuers are generally called to the scene of an accident where risk assessment by the subject already led to the need for the rescue.

What is Decision Making? In the "Crew Resource Management" program of their Aircrew Coordination Training, the United States Navy defines effective decision-making as "the ability to use logical and sound judgment to make decisions based on available information."

This includes:

- Assessing the problem
- Verifying information
- Identifying solutions
- Anticipating consequences of decisions
- Informing others of decision and rationale
- Evaluating decisions

Risk assessment is the core of this program, and rescuers must pay great attention to this essential element. For example, is a helicopter proposed for the rescue? If so, is it necessary? Has the rescue leader truly considered the danger of airborne rescue operations? If the subject's injuries are indeed life threatening and the survivability depends on immediate evacuation, then helicopter resources might indeed be indicated. If, on the other hand the subject's condition is stable and the use of a helicopter will accomplish no more than reducing a 12-hour carryout to a 1-hour evacuation, prudence might dictate the carry out is the most risk-free alternative.

In the case of technical rock rescues, rescuers must have the skills necessary to evaluate the situation. Is the slope stable? Are the proposed anchors suitable for the operation? Is there an alternative to the technical rescue?

With body recoveries, rescue leaders must consider carefully any risks proposed. In this case, a helicopter recovery might not be warranted. In fact, any dangerous rescue operation involving a body recovery must be carefully evaluated. Remember, in this case, time is NOT of the essence. Once rescuers know their subject is deceased, everything in the recovery operation should slow down.

Body recoveries in avalanche rescues are certainly not the time to put rescuers at risk.

Remember that the hazard is already very real, since an avalanche has obviously occurred. Rescuers should consult with avalanche forecast experts before racing to an avalanche with a known deceased subject. The use of helicopters to retrieve deceased subjects should only be considered if a ground-based recovery would put rescuers at great risk. Even then, accidents can happen...

> *On June 16, 1975, rescuers from Yosemite National Park were called to a climber who had fallen 150 feet on El Capitan. Ranger Dan Sholly was the first to the subject, Peter Barton, who had sustained fatal injuries. In lieu of a very difficult evacuation over treacherous cliffs, Sholly called for a UH-1 Huey helicopter from the San Joaquin Valley's Lemoore Naval Air Station.*
>
> *On board the helicopter was a crew of six. Shortly after hoisting the dead climber into the helicopter, one of the two engines quit. The chopper rolled to the right side in a spiral descent that included two 360-degree turns. It crashed into the trees, approximately 500-600 feet below the original rescue. Although the deceased subject and the helicopter were burned, nobody on board was seriously hurt.*

Rescue leaders should constantly question their mission progress. Analyzing the situation, leaders should constantly evaluate their image of the mission.

Hazard Recognition

Statistics show that many people experience some anxiety when they fly on a commercial airplane. Still, if you boarded a jet at random every single day, it would be 26,000 years before you would be involved in a major crash... and even then, the odds are you would survive.

Recognition of the difference between real and imagined hazards is important for both the rescue leader and the rescue member.

Rescuers in mountain rescue operations must have the ability to recognize the real hazards present in their environment. Certainly Mother Nature provides most of these hazards, as mentioned earlier. The ability to recognize avalanche hazards is essential in the winter environment. In the summer, recognition of storms likely to produce lightning is important as well, since rescuers are often working in close proximity to each other and near the top of a mountain, a dangerous situation in any electrical storm.

Rescue mountaineers on board fixed-wing and rotary-wing aircraft should understand that everyone on board is an extra set of eyes and ears. Rescuers should never assume the pilot or crew has seen something that the rescuer sees. Apparently obvious safety hazards are not always obvious, and communication with the pilot is essential when a hazard is identified. In 80% of helicopter accidents someone on board saw something that looked out of place - but said nothing to the pilot - thinking it was not their place, or that the pilot was aware of the hazard. In one particular accident, a passenger noticed that the fuel gauge read "empty." The passenger said nothing. The ship later ran out of fuel and crashed. Rescuers must know how to use the aircraft's intercom system - and not be afraid to use it when a hazard exists.

Experience leads to greater ability to recognize hazards. For this reason, hazard evaluation should be left to those most experienced rescue members.

Experienced rescue leaders know that numerous hazard elements can compound upon themselves to produce a dangerous situation. For example, an electrical storm in the spring, preceded by rain, during a freeze-thaw cycle could compound the hazards of lightning and rockfall to create an even more dangerous situation. Many accidents occur when a series of things compound upon themselves, so when there appears to be a sign of some series presenting itself, it is not inappropriate to stop the rescue and reevaluate the hazard. Break the chain – when you realize that elements are starting to compound upon themselves, pause for a moment and reevaluate the situation.

> *On June 25, 1994, rangers from Rocky Mountain National Park were conducting a rescue of a fallen climber in the area of Hallett's Peak. While shuttling two additional rescuers to a helispot reported to be between 11,800 feet and 12,460 feet, a Bell 206A helicopter crashed at 8:49 p.m. (just before dark).*
>
> *The accident investigation determined that the original load calculation was in error and a new one was never completed following a refueling operation just prior to the accident (Helispot coordinator argued with the pilot about the load calculation, but the pilot was allowed to fly anyways). As rescuers pushed to complete their mission prior to sunset, the pilot had attempted the high altitude landing with a helicopter that was 700 lbs. overgross. As the pilot lost tail rotor effectiveness, he augured the helicopter into the ground and fortunately all personnel survived the crash.*
>
> *The incorrect load calculation, argument between flight crew members, loss of natural light, and a hurried pilot were all contributory causes of this accident.*

Ken Phillips, Grand Canton National Park SAR Coordinator developed "12 Standard Aviation Questions That Could Save Your Life." Although these questions were developed for aviation, they can apply to most any rescue scenario.

1. Is the flight necessary?
2. Who is in charge?
3. Are all hazards identified and have you made them known?
4. Should you stop the operation due to:
    a. Communications?
    b. Weather?
    c. Turbulence?
    d. Personnel?
    e. Conflicting priorities?
5. Is there a better way to do it?
6. Are you driven by an overwhelming sense of urgency?
7. Can you justify your actions?
8. Are there other aircraft in the area?
9. Do you have an escape route?
10. Are any rules being broken?
11. Are communications getting tense?
12. Are you deviating from the assigned operation or flight?

Phillips concludes this list with "When in doubt – don't!"

Situational Awareness?

"Situational Awareness" refers to the degree of accuracy by which one's perception of his or her current environment mirrors reality. Situational awareness is a key component to risk assessment.

For over 30 years, situational awareness has been used in military, civil, commercial and aerospace applications. Situational awareness requires the human operator to quickly detect, integrate and interpret data gathered from the environment.

There are three stages of situational awareness

1. The perception of the relevant information

2. The comprehension and interpretation of that information
3. The projection of their states into the future

The first stage, "perception," requires that you are persistent in your observation. Yogi Berra once said, "You can observe a lot by just watching." He must have been referring to situational awareness.

The second stage, "comprehension and interpretation," requires you to have and utilize your training and experience. Training is a key component of teaching SAR workers, but experience is the key to understanding how to best utilize that training.

The third stage, "projection into the future," is the stage where you put it all together!

For example, if you want to know if it is going to rain, don't look for rain. Look for CLOUDS! If you look for rain you'll only know that rain is coming when it arrives. If you look for clouds, you can anticipate the possibility of rain before it occurs. The third stage tells us that you need some training to know WHAT TYPES of clouds cause rain. A sudden build-up of cirrus clouds vs. cumulonimbus clouds can make a big difference in your prediction.

The United States Navy has identified seven key factors that reduce situational awareness. They are:

1. Insufficient or poorly communicated information
2. Fatigue / Stress
3. Task Overload
4. Task Underload
5. Group Mindset
6. "Press on Regardless" Philosophy
7. Degraded Operating Conditions

The Navy further suggests ten ways to prevent the loss of situational awareness:

1. Actively question and evaluate your mission progress
2. Analyze your situation
3. Update and revise your image of the mission
4. Use assertive behaviors when necessary;
5. Make suggestions
6. Provide relevant information without being asked
7. Ask questions as necessary
8. Confront ambiguities
9. State opinion on decisions/ procedures
10. Refuse unreasonable requests

Overconfidence and/or a lack of situational awareness are two key factors that lead to skilled people getting into trouble in the backcountry.

Listed below are a number of useful tips to keep in the back of your head during SAR missions:

1. If something doesn't look or feel right, then it probably isn't right
2. Watch out when you are busy or bored
3. Old habits are hard to break
4. Expectations can impede awareness
5. Things that take longer are less likely to get done right
6. Don't rely on reliable systems
7. Don't get too excited if an emergency occurs. That's when you'll make poor decisions.
8. Prevention is the best way to avoid backcountry emergencies, and Situational Awareness is the best form of prevention there is.

Fatigue can impair your abilities... Later in this program, we will discuss the effect of fatigue on situational awareness.

Adaptability and Flexibility

Adaptability and flexibility are important in search and rescue operations. Key to adaptability and flexibility is the rescue leaders ability to anticipate potential problems, and then recognize and acknowledge any meaningful change in the circumstances of the rescue operations. When a change is considered, rescue team members and rescue leaders must be careful to study and evaluate the risk of alternatives before rushing into any deviation from the established plan.

Deviation from the Established Plan

As important as adaptability and flexibility are, one of the common causes of rescue accidents occurs when the rescue team deviates from an established plan. The "tail wagging the dog" theory can occur when the circumstances of a rescue change and team members alter the plan to accommodate the change. While altering plans is unavoidable in search and rescue missions, it can lead to disaster because it often leads to making changes in great haste – inviting mistakes.

Whenever the rescue plan is altered, rescue leaders and rescue members must reevaluate the risk and hazards before accepting the proposed variation.

In his study on fatigue and SAR, Robert Koester of the Virginia Department of Emergency Services notes that the typical error of a sleep-deprived subject is "completely forgetting to perform a task as opposed to incorrect performance." Think about that – completely forgetting to perform a task? Scary when you consider the importance of our knots, our harnesses, our subject tie-ins. Grand Canyon National Park submitted this accident report that underscores how "complacency kills"

> *During September 1996 Travis Hull was demonstrating a two-point anchor system, constructed of webbing with a single carabiner. This demonstration was being conducted for juvenile participants of the North American Wilderness Academy training course. The anchor system had been constructed by the participants, checked by the other instructors and then checked by Travis Hull.*
>
> *Travis intended to demonstrate how one point of a two-point load-distributing anchor could fail and the entire system will not have complete failure. He pulled out a knife and went to cut one piece of webbing that was an anchor point extension. The webbing that he intended to cut was completely beyond his normal reach and he accidentally severed the piece of webbing that attached his seat harness to the anchor system. He fell backwards and suffered a fatal fall to the creek below.*
>
> *Hull was not only a member of the Shasta County SAR Team, but also the leader of the Mountain Rescue Unit. He was considered to be extremely knowledgeable in rigging techniques and his peers considered him "ultra-conservative" in relation to the issue of safety. He was a "certified" instructor in technical rescue and swift water techniques.*
>
> *The night before the accident Hull had become engaged to be married. This accident illustrates how every rescue professional needs to be constantly thinking about their actions during an operation.*

In his report, Robert Koester also notes that "errors are not typically seen if the subject is given unlimited time to complete a task. Instead, errors begin to occur when the staff members are forced to generate several tasks within a short period of time."

We should remember this effect of sleep deprivation when it comes to the end of the rescue as well. Exhausted rescuers are at great risk when they get behind the wheel of their own car after the rescue is terminated.

Working Outside the Normal "Comfort Zone"

Over the decades, many rescue accidents have occurred when the rescuers work outside their normal comfort zone – utilizing techniques that they have never practiced or working with agencies with whom they have never worked. For this reason, it is critical that rescue teams train often with agencies with which they might work in the field. Equipment and techniques should be practiced repeatedly to avoid an accident resulting from lack of experience.

On December 9, 1989, 9 year-old Debbie Baisa fell in the Franklin Mountains outside El Paso Texas. She had sprained her ankle. Six rescuers from the police Mountain Rescue Team reached the girl at dusk. They strapped her in a Thomson litter and tried, unsuccessfully, to carry her down the steep slope on foot. Due to the late hour, and falling temperatures, the El Paso EMS Division requested a MAST helicopter from Fort Sam Houston, Texas. They requested a hoist extraction.

Once over the scene, the helicopter crew determined the area unsuitable for landing, due to the slope and terrain. A medic was lowered 50 feet by hoist, where he evaluated the patient. The medic then notified the pilot that the Stokes litter and patient were ready for the hoist operation. The litter immediately began to spin, and at 30-feet above the ground, the spin was uncontrollable. The patient was ejected, feet first, from the litter. She suffered head and internal injuries, a fractured pelvis and several fractured ribs. She spent four months in a body cast.

Although the Army and police rescue team had met to review the Army rescue equipment, the pilot later stated that two groups had never practiced the hoist operation they attempted that night. Upon a thorough study of the accident, an investigation board found the following factors contributed to the accident:

1 - The litter assembly was incomplete, and was lacking a foot board,
2 - The mountain rescue team only secured the patient in the litter loosely for ground transport,
3 - The Flight Medic was not familiar with the litter, which turned out to have unacceptable aerodynamic properties. The slitter was a solid Thomson litter, yet she called it a Stokes litter. The manufacturer guidelines for the litter suggest a tag line should be used during hoist operations.
4 - The US Army Aeromedical Center had not made firm recommendations regarding the use of tag lines to prevent the spin that occurred during this incident.

Until the medic was lowered, rescuers on the ground had prepared to load the litter in a one-skid loading. This may have led to their loosely securing the patient. They also had no direct radio contact with the helicopter.

Judgment and Rescue Leadership

Judgment is one of the most important elements to avoiding risk in mountain rescue operations. Once you've recognized the hazards and assessed the risk, it is your judgment that will lead to whatever modifications you make to the rescue plan.

Being prepared in all areas leads to better decision-making. It will reduce risk and result in the highest safety factors. Assessing risk means knowing what components to evaluate, and how to measure the associated hazard.

Leadership is an important asset to any rescue operation. Many rescue mountaineers have the ability to lead; yet all need the ability to work under the leadership of another rescue member.

Rescue leaders must be acutely aware of the risks and hazards presented by the rescue environment. A good rescue leader will not work on the actual rescue system him/herself, but will stand back to manage the entire situation. Often, the rescue leader will have one or more "deputies," each of which has a unique set of individual and management responsibilities.

While rescuers should not blindly follow instructions without first evaluating the instruction to determine what safety issues might be jeopardized, rescue members must follow tasks assigned by the leader. The leader is relying on the rescue members to complete the assigned task, and then ask for another task. In the accident below, a pilot chose not to follow instructions from rescue command, and it resulted in a fatality.

> *In early-August, 1988, Chicago Sportswriter Keith Reinhardt, a novice and somewhat fearful hiker, attempted to climb the steep and heavily wooded slope of Pendleton Mountain, north of Silver Plume Colorado. He took only a can of soda. He never returned.*
>
> *Rescuers searched for Reinhardt for seven days. Involved in the search were ground personnel from four states, six helicopters and two fixed-wing aircraft from the Civil Air Patrol.*
>
> *On the fifth day of the search, a Civil Air Patrol Cessna 182R fixed-wing aircraft participated. Due to a large number of search and rescue helicopters operating that day, and the gusty winds, the SAR Incident Command requested the fixed-wing pilot to maintain an altitude above 13,000 feet MSL. For unknown reasons, the pilot descended well below the 13,000-foot level during his flight. It is estimated that he was flying at 11,000 feet when it crashed. NTSB reports indicate… "A passenger reported that the pilot said 'I don't like the feel of this.' A paramedic said the passenger also related that they had 'hit a downdraft.' A helicopter pilot flying in the area said that the winds were not conducive for fixed wing flights, especially in the trenches."*
>
> *Rescuers were immediately flown to the site by Army Chinook helicopter, where they rescued the passenger, who survived the crash numerous despite serious injuries. The pilot, Terry Leadens (40) of Franktown Colorado died in the crash. The National Transportation Safety Board determined the probable cause(s) of this accident as follows: Weather evaluation – Inadequate - pilot in command; Airspeed – Inadequate - pilot in command; Altitude – Inadequate - pilot in command.*
>
> *Rescue leaders at this accident were aware of the winds, and had give instructions to the pilot that had not been followed.*
>
> *The missing hiker was never found.*

Triage and Dispatch

It is accepted in the emergency response field that appropriate triage and dispatch decisions are critical to the survivability of the victim or victims. Poor or no triage easily results in increased liability to the agency, but more importantly, it results in poor or inappropriate or incomplete resources sent to the victims.

There is little written of triage and dispatch for a mountain rescue or technical rescue incidents, and it is for this reason that Appendix A is included as a resource. Appendix A is the Mountain Rescue Association's "Triage and Information Guideline."

Teamwork

Solo rescues (1 or 2 rescuers heading into the field without waiting for more help) can be extremely dangerous. For this reason, only experienced Rescue Technicians should be permitted to proceed with accessing a subject in technical terrain alone. Even then, he/she should access, stabilize, and await the rest of the team.

Most rescue teams have numerous "ranks," divisions that identify specific skill levels. These ranks frequently include support rank, rescue rank and qualified rank (in increasing order of skills). Many teams will only allow their most experienced rescue or qualified members to consider going in the field in very small groups.

No one should be deployed into the field alone or to return from the field alone except under extremely favorable circumstances (good radio, weather, experience, short travel, etc.)

Separating from the team and/or doing a task other than that assigned can result in big problems. This type of freelancing is generally dealt with very severely among professionally acting teams and agencies because of the hazards involved.

All team members must follow Incident Command System (ICS) concepts.

Knowledge of Resources Available

Rescue teams must have adequate additional resources available to them. The rescue team's leadership must have an awareness of those resources, and how they are called to respond. This awareness must include an awareness of not only the skills but also the limitations of those resources.

These resources include:

- Additional rescue teams in the surrounding area
- Search dogs
- Medical resources
- Airborne Resources including med-evac services

The prudent rescue team will have a carefully developed "Pre-Plan," which includes resource lists and call-out procedures.

Most important, rescue teams should frequently engage in joint trainings with these resources. This will assure that both groups understand the skills and limitations of each other. By so doing, neither group will have an unrealistic expectation of the other.

Knowledge of When the Rescue is over

The mission (rescue OR search) is never over until:

1. Each subject has been given a documented medical evaluation on scene (even if brief or documented as a refusal).
2. The local law enforcement agency has interviewed the subject(s).
3. Each subject has been interviewed as to the technical aspects for the team's mission report and for a

report to The American Alpine Club (AAC) “Accidents in North American Mountaineering.” Each person should also be given an AAC Accident report if this involved climbing or mountaineering.
4. All gear is stowed.
5. A debriefing has been done.
6. A Critical Incident Stress Debriefing (CISD) is considered and planned for by the command staff.

Rescuers must beware of premature cancellation pages, shutdown or demobilization. A mission response should continue, and personnel should not leave a mission before all personnel from all agencies are safely out of the backcountry, including helicopters that are transporting personnel.

It is always a difficult question of when to "call" the mission (when to suspend or permanently terminate a search). Clearly, missions should be suspended whenever there is the presence of unsafe conditions for rescuers. In addition, searches are often suspended when the rescue teams are unable to locate the subject and all areas have been covered repeatedly.

Finally, once a mission has been completed, teams must be concerned about the well being of the rescuers who now return to their normal lives. Teams should consider using the buddy driving system, or suggesting that team members rest before driving home from a mission when tired.

The buddy driving system includes having buddy drive in front or behind and talk to you on a "talk" channel on the radio to keep you awake.

Critical Incident Stress Debriefings (CISD) are a valuable resource for rescue team leaders. All rescuers are at risk of experiencing what psychologists refer to as a traumatic incident – one that may include exposure to catastrophic events or an unsightly scene. Rescuers may experience one or more of many reactions, including physical, emotional, cognitive, or behavioral symptoms. Some people experience these symptoms immediately while at the scene. Others may not experience anything for a period of weeks or months. For all rescue members, a CISD should be considered and scheduled as early as possible.

Part 4 – Emotional Elements

Several emotional elements add risk to rescue operations. These elements are not easy to recognize, but can be very dangerous.

Ego

Certainly rescue mountaineers have healthy egos, or they would not have put themselves in a profession requiring the ability to deal with such extreme circumstances. The existence of such healthy egos can be a great advantage to any rescue team. It can also be a great hazard.

Rescue leaders must assess the rescue operation and ask whether or not egos are leading to decision-making that may not be prudent. Are rescuers proposing a technical rescue operation when there is an easier way out? Has the team asked for a helicopter when the patient's condition does not warrant inclusion of such a dangerous element?

To a great extent, the rescue leader should be the "ego monitor." Individual members should also monitor themselves. Rescuers must avoid joining the "dead hero's club".

One time to seriously consider whether egos are involved is when television cameras are present.

Who Comes First?

In the urban rescue environment, it has often been said, "the subject comes first." This has not been the case for mountain rescue environment. Many mountain rescue teams have established priorities relative to the rescue team and its subject. Often it is said that:

1. My safety comes first
2. My teammates' safety comes second
3. The subject comes third

This is necessary in the mountain rescue community because of the numerous hazards present to both the individual rescuer and his/her teammates. Only by focusing on these priorities first can a qualified rescuer focus on the needs of the subject.

"Go Fever"

On January 27, 1967, three U.S. astronauts were tragically killed in a cabin fire aboard the Apollo spacecraft at Cape Canaveral. They had been performing final tests just days prior to their scheduled earth orbit.

In the months that followed the fire, specialists concluded that the space program was moving too quickly in the race to land a man on the moon. At that time, and even today, Launch Control engineers seek a "go" or "no go" for every aspect of the countdown, even during tests in the days before. During the actual launch, the communications is as follows:

<u>Launch Control Engineer</u>	*Response*
"Booster"	*"GO!"*
"Retro"	*"GO!"*
"Network"	*"GO!"*
"Recovery"	*"GO!"*

And all of this is followed by: "Launch Control, this is Houston, we are GO for launch."

The investigation following the Apollo disaster revealed that the astronauts, who privately mentioned concerns about the new spacecraft to each other and their wives, had not mentioned the concerns to their leadership. A new term was created to define what was the cause of this tragic accident. The term was "Go Fever."

Hazards recognized by the Apollo I astronauts were not made known to the leadership. Had they been, the highly volatile 100% oxygen environment in the cabin of the spacecraft would likely have been changed, as it had been in military aircraft many years earlier.

Rescuers must be equally aware of their desire to move quickly in a rescue operation. Often, hazards are not recognized when the focus is on speed. A "hero mentality" can often lead to disaster, as rescuers do not take the time to thoroughly assess the hazards present in the rescue environment. Each and every rescue leader and rescue member must be capable of saying "No Go" at any time.

Along these lines, rescue leaders who engage in back country rescue operations must realize that the subject is usually already stable - dead or alive. "Rescue Fever" must be avoided at all costs.

On October 14, 1968, Climber Jim Madsen (20) and four others went to the top of El Capitan to go to the aid of two climbers who had been on the Dihedral Wall since Oct. 9. Madsen and another climber planned to rappel down from the summit to Thanksgiving Ledge and make contact with the climbers from there. They established a rappel anchor, and Madsen began his rappel with five ropes, two pairs of Jumars, carabiners and pitons, a radio, and two thermoses of hot soup.

Madsen tied a knot in the end of his 11mm rope, and rappelled using a 2,2 and 2-carabiner brake system. As he rappelled down, he lost his rappel and slipped off the end of the rope and fell to his death. He fell 2,500 feet. "Rescue Fever" was sited as one cause of the accident.

The original climbers in need of help stated they were all right and they finished the climb under there own power.

Part 5 – External Influences

There are several external influences that can increase hazard and lead to disaster in rescue operations. Awareness of these external influences is critical to risk evaluation.

Public and Official Pressure

Often, there may be pressure from the media, the general public or other official agencies to deviate from a rescue plan. In this case, the Incident Commander and/or rescue leader must remember that our responsibilities are as follows:

1. My safety comes first
2. My teammates' safety comes second
3. The subject comes third

Nowhere in this equation does the pressure from public or other agencies come in to play.

An example of such pressure would be when an avalanche closes a major highway with the possibility of subjects in the debris field. While highway officials might pressure rescuers to first assure there are no subjects in the avalanche debris on top of the highway (so that they can begin plowing the debris to open the road), avalanche rescuers might be more focused on the toe of the slide path and other likely burial areas away from the road. If an accident occurs which crosses a roadway, there may be significant pressure to open the road as soon as possible. Snow removal equipment will generally be brought to the scene quickly, often sooner than the rescue personnel are capable of declaring the area clear of subjects. The highway departments' urgency to reopen the road should be secondary to the avalanche rescue efforts.

Any responsibility to quickly reopen the roadways is secondary to our responsibility to the subject. Still, we must understand the responsibility of highway personnel who are under extreme pressure from their superiors to see that the road is reopened as quickly as possible. Clear and frequent communication with these authorities can ensure that both the SAR personnel and the highway personnel clearly understand each other's objectives.

Subject's Friends and Family

Family members or friends of a rescue subject may also exert pressure on rescue leaders. It is often difficult to deal with distraught family members or friends while trying to effect a successful rescue. In this case, rescue leaders should assign a team member to act as liaison between the leadership and the family or friend. The rescue leader must insulate him/herself from pressures exerted by these individuals.

Often, the Incident Commander and/or Sheriff's Deputies will keep family members or friends away from the scene. In the event that family members or friends do arrive at the scene, the Rescue Leader should seek the assistance of the Incident Commander to get a qualified individual to accompany these individuals so that the Rescue Leader may continue his/her function. This individual should be competent in areas relative to the emotions that the family or friends are feeling. This person should constantly monitor the condition of the family members or friends, and be prepared to evacuate them if their emotional or physical conditions warrant this.

Family members should be briefed early and often.

Media

In the event of rescues with media attention, it may be difficult to keep the media away from the accident site. Allowing media to the site does not give them Carte Blanche - establish and enforce guidelines for the media.

The decision to allow the media to the accident site is made only after the absolute safety of the area is determined. Allowing the media to the site does not necessarily present a problem if the rescue leader is careful to rope off an area beyond which the media is not allowed. Furthermore, isolation of the reporting party or any other family members from the media is important. These family members or friends must know that the decision to talk to the media is theirs.

The decision to allow the media to the site is often made by the Incident Commander and/or Sheriff's Deputies, with the input from the rescue leader. Remember that the media is our friend, especially the TV stations that provide helicopters for search activities during all seasons.

Rescue teams should establish strict protocol regarding whom among the team should speak with the media. Unfortunate situations involving miscommunication can occur when any team member is allowed to speak with the media.

Other Outside Influences

Rescuers must be aware of any other outside influences that can cause problems during a rescue operation. In the rescue accident detailed below, the initial rescue effort of a crashed commercial helicopter was undertaken by the helicopter operator themselves. The helicopter operator chose not to call for search and rescue, presumably to downplay the initial crash...

On September 10, 1999, a flight-seeing helicopter had just finished a glacier landing in the Juneau Ice Field with five flight-seeing passengers. The aircraft was flying through a mountainous valley where radio signals were blocked. On its way back to the Juneau Airport, the pilot encountered localized light snow shower and "flight light conditions" which reduced his forward visibility and his ability to recognize any topographical features on the ice surface or the mountains around him. The helicopter slowed from 110 to 75 knots, and then struck the snow-covered ice field, slid about 150 feet, and nosed over. Although the helicopter was destroyed on a 150-foot long wreckage path, the pilot and passengers all survived. The crash destroyed the antennae, making the radio and ELT inoperable.

Realizing that one of their helicopters was overdue, the base manager contacted other aircraft in the area. Another helicopter company, with an FAA check pilot on board, spotted the missing helicopter on the ice through the approaching storm. Seeing all 6 passengers standing outside the helicopter, the pilot radioed that they appeared to be all right and it looked like they had "a mechanical". What he thought was the rotors of the aircraft were actually the skids of the overturned helicopter.

Based on that information, the base manager dispatched a small utility helicopter with a pilot and a mechanic to the scene. This aircraft encountered the exact "flat light" circumstances as the first aircraft, and hit the snow as it searched for the first crash site. Both escaped unhurt. The crash sites were in a deep glacier valley at 5600'. The mountains again blocked radio signals. With no way to contact the second aircraft, the base manager waited for 30 *minutes and then dispatched a third utility helicopter to support the other 2. The third helicopter found and picked up the pilot and mechanic of the second crashed helicopter. At that time, they all elected to search for the original missing helicopter. The third helicopter also encountered the same "flat light" conditions and struck the unseen snow-covered ice field in full view of the first survivors. It slid about 50 feet, nosed over, and rolled to the left. All 4 occupants survived. They dug a snow cave and prepared to wait out the storm. The first aircraft survivors built an igloo using the survival kit rubber container as a mold.*

After losing contact with the third helicopter, the base manager contacted the Alaska State Troopers, and a search was initiated. A command post was activated. Fixed base operators, Coast Guard, 4 helicopter companies, Juneau Mountain Rescue, SEADOGS, Civil Air Patrol, FAA, the hospital and the fire department were all involved in the ensuing rescue effort, which took place in extremely difficult weather conditions. The Air Operations Manager sent several Helicopters into the area, but weather pushed them back. Juneau Mountain Rescue was airlifted to 4,200' and began their climb. They found the first crash site in the dark shortly before 11:00 p.m. that night.

At first light the following morning, 4 helicopters from 4 companies waited on the ice at 4,000' under the storm for the weather to break. A Coast Guard HH-60 helicopter arrived, and it rescued the six survivors of the initial crash by hoist. The Coast Guard and another flight-seeing helicopter rescued the remaining crash victims from the other two flight-seeing aircraft.

The base manager was recognized for his support and effective management of the Air Operations division of the Incident Management Team. Members of the rescue team were awarded the Coast Guards second highest national medal for heroism. The company has since redesigned the antenna system on the A-Star series aircraft to allow for manual operation; radar altimeters have been installed; and each pilot carries a handheld radio.

The Subject's Emotional and Psychological State

As with any emergency medical situation, rescuers must maintain close personal contact with the subject. As such, the subject's emotional and/or psychological condition may exert pressures on rescuers. In this case, rescuers must maintain a clear focus on the rescue operation and the rescue systems employed, and avoid letting the subject's state distract them from the hazard assessment of other factors mentioned above.

Rescuers should be aware that a patient's condition may worsen upon the arrival and care administered by the rescuers themselves. Once referred to as "Rescue Shock," it was assumed that a subject's efforts to "fight" to stay alive are reduced as the subject feels the rescuers will "save the day." In fact, research indicates that the patient's condition may, in fact, worsen due to the treatment given, and not due to the patient's mental state. For example, a hypothermic patient may go into ventricular fibrillation ("V-fib") due to the increased activity and movement that results when rescuers arrive. Rescuers must understand the underlying reasons why a patient's condition may worsen upon their arrival, in order that they may protect against it.

Rescue team members should always consider the possibility that their subject may have a mental illness or behavioral issue that would be exacerbated during the stress of being lost or stranded, or by missing their medications. This also applies to those on non-behavioral medications such as insulin/glucose, which can lead to bizarre or aggressive behavior. There are real cases of rescuers being injured and evacuated from injuries incurred as a result of subjects throwing rocks at them.

Rescuers should also consider that a subject may be a suspect in a crime or may have a weapon. The concern over weapons is especially real during searches for suspected suicidal suspects.

Conclusion

While much has been written about technical rescue systems, mountain rescue techniques, and mountaineering safety, little attention has been paid to the overall issue of hazard and risk assessment in mountain rescue operations. What has been written makes it clear that subjective factors are involved in all accidents.

It is essential that while rescue leaders focus on the objective issues of technical rescue systems and safety, they must also pay attention to the more difficult subjective issues of Mother Nature, physical/mental/emotional elements and external influences. These subjective issues easily increase the risk factors of any mountain rescue operation.

Appendix A
Technical and Mountain Rescue Triage and Information Guideline

(For Communications and Field Personnel)

Effective decisions can be made by Communications or field units using this guide, thereby eliminating most delays. This information should be gathered at the time of the reporting call. It should be confirmed for accuracy upon arrival of the first unit. This is not intended for Searches or missing subjects, but can be adapted for its use. The MRA has a PowerPoint presentation and instructor available for this module.
Bold denotes the minimum information that the rescue unit and SAR Coordinator should be given.

A. STANDARD PUBLIC SAFETY DISPATCH INFORMATION:

- Caller Name, Location, Call back number, Home number
- RP name, if different. Location, Call back number, Home number
- Victim(s) Name, Age, Description *, Vehicle description and vehicle current location

*victims seemingly incapacitated have been found to be hiking out on their own, so a description is still useful for responding units.

B. INITIAL RESCUE-SPECIFIC INFORMATION. Focus; Minimum information get units responding.

Determine TYPE OF SITUATION (circle). Is this a

RESCUE

RECOVERY (body, etc.)

AIRCRAFT-INVOLVED

SEARCH

Disaster - Other or unknown

STAND-BY (Alert) only, at this time?

When in doubt, always page as a "stand-by or alert" call, then consult a SAR Coordinator or Operations Leader.

LOCATION

WHERE IS IT HAPPENING?

How far from the nearest road or trailhead?

¼ mile or farther, or high angle? Page mountain rescue team regardless of other resources.

VICTIM STATUS, RESPONSE PRIORITY

How many victims?

IS ANYONE INJURED? Yes = HIGHER RESPONSE PRIORITY

 Generally Classify as: **Minor - Moderate or Serious injuries**, unknown.

UNSTABLE, HIGHEST RESPONSE PRIORITY

(Dispatch should help to coordinate a small Hasty Team response via Air assets in these cases);

- PERSON APPEARS Moderately or Seriously INJURED;
- In Apparent DANGER OF FALLING;
- In Apparent DANGER OF FURTHER INJURY;
- On an Apparently SMALL OR UNSTABLE LEDGE;
- In a REMOTE SITE (further than ¼ mile from a major trailhead);
- Any SWIFT OR FLOOD WATER RESCUE;
- NO ONE IS WITH THE PERSON;
- PERSON HAS NOT BEEN CONFIRMED AS DECEASED;
- CIRCUMSTANCES ARE UNKNOWN;.

STABLE, Lower Response Priority;

- Person is on solid ground; a safe, large ledge and no fall potential; on the ground; confirmed deceased.

C. <u>FOLLOW-UP INFORMATION TO GIVE to the responding Field Team Leader and SAR Coordinator.</u>

Specifically what type of mission is this?

HIGH ANGLE
ROUGH TERRAIN
MINE or CAVE
SWIFT WATER
ALPINE
Unknown or Other

WHERE TO STAGE?

- Good directions or someone to guide units in.
- Is anyone with the victim(s) yet? Who? (medical capabilities)
- What other agencies, units or groups are on-scene or en-route?

Additional questions to ask reporting party(ies);

- When did the accident happen?
- Apparent Illness, Injury or problems of each victim
- Medical and Behavioral History
- Can you see them from where you are? (stay on phone, give updates)
- When did you last see them?
- About how far up, down, or out to the person? (Feet, car lengths, etc.)
- Does the person(s) with the victim have any medical training or gear?
- Is there specific medical equipment known to be needed?

Other information

- **WHAT RADIO FREQUENCY is being used on scene?**
- Is there any helicopter (law enforcement, military, rescue, medical, etc.) en-route or on-scene?
- What has already been done by those on-scene?

Additional Hazards

- Is an apparent **Suspect** of a crime, a violent or **Threatening** subject or **Mentally Unstable** person involved, etc.?
- Any other notable hazards? (weather, visibility, fire, lightning, predatory animals, etc.)

Special Equipment issues

- Are especially long ropes (400+ feet), or specialized caches (air bags, air monitoring equipment, etc.) thought to be needed?
- Is a stokes litter on scene? (may make travel quicker and lighter in small helicopters)

Searches

Additional questions may be added for searches or missing subjects.

Form: Revised 12-17-99

Appendix B
Mountain Rescue Triage Supplement
Sample Dispatch Sequence

1. The call comes in;
    a. to 911 center from citizen, outdoor group, other agency or PSAP
    b. to dispatcher from a field patrol unit
2. Phone operator or Dispatcher gathers Initial Information
3. Dispatch Rescue Team or place on Stand-By
4. Dispatch pages team via pagers or radio with the following information;

    "Rescue Team callout for an apparent High Angle Rescue at Red Dog Cliffs in the Beavertail Mountains, reported as a male who fell unknown number of feet. Unknown injuries. No further information. Tom-526 (field deputy) and EMS en-route. Aviation will stand by for 5 minutes to arrange pickups before launching.(meaning a prearranged plan for the team leader to coordinate with aviation assets). Traffic will be on channel 8."

5. Dispatch notifies duty SAR Coordinator. For Searches, the SAR Coordinator is consulted before any dispatch.
6. Gather secondary information
7. Secondary page with additional information to team and SAR Coordinator;

a. "Subject reported as on a ledge about 100 feet up, and not moving. Tom-526 is still en-route, and advises Red Dog Cliffs has no close LZ and is 2 miles from trailhead. Caller states unknown time of occurrence, but caller started hiking out at 1345 hours. Two friends stayed to attempt help. EMS is on scene and hiking the trail. SAR Coordinator is en-route."

8. Team Duty Field leader or SAR Coordinator will typically coordinate aviation pickups and page its units for further updates.
9. First on-scene deputy can confirm all dispatch information and use this guide to collect further.

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MOUNTAIN RESCUE ASSOCIATION

The Mountain Rescue Association is an organization dedicated to saving lives through rescue and mountain safety education
www.mra.org